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PTO/SB/05 (4/98)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No.	0694-134
First Inventor or Application Identifier	Yoshio Hashibe
Title	Fire-Protection Glass Panel With a Heat Shielding. . .
Express Mail Label No.	EL467166250US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231**

1. [✔] * Fee Transmittal Form *(e.g., PTO/SB/17)* *(Submit an original and a duplicate for fee processing)*
2. [✔] Specification [*Total Pages* 12]
   (preferred arrangement set forth below)
   - Descriptive title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. [✔] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 2]
4. Oath or Declaration [*Total Pages* 2]
   a. [✔] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 C.F.R. § 1.63(d)) *(for continuation/divisional with Box 16 completed)*
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

5. [ ] Microfiche Computer Program *(Appendix)*
6. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Copy
   b. [ ] Paper Copy (identical to computer copy)
   c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. [✔] Assignment Papers (cover sheet & document(s))
8. [ ] 37 C.F.R.§3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
9. [ ] English Translation Document *(if applicable)*
10. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
11. [ ] Preliminary Amendment
12. [✔] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
13. [ ] * Small Entity Statement(s) *(PTO/SB/09-12)* [ ] Statement filed in prior application, Status still proper and desired
14. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
15. [✔] Other: check for $ 40.00 and $ 690.00

16. **If a CONTINUING APPLICATION,** *check appropriate box, and supply the requisite information below and in a preliminary amendment:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: _____/_____

Prior application information: *Examiner* _____ *Group / Art Unit:* _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

[ ] *Customer Number or Bar Code Label* *(Insert Customer No. or Attach bar code label here)* *or* [✔] *Correspondence address below*

Name	Hopgood, Calimafde, Kalil & Judlowe, L.L.P.				
Address	60 East 42nd Street				
City	New York	*State*	NY	*Zip Code*	10165
Country	USA	*Telephone*	(212) 551-5000	*Fax*	(212) 949-2795

Name (Print/Type)	Bradley N. Ruben	*Registration No. (Attorney/Agent)*	32,058
Signature	Bradley N. Ruben	*Date*	10/2/2000

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FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT ($) 730.00

Complete if Known	
Application Number	NA
Filing Date	NA
First Named Inventor	Yoshio Hashibe
Examiner Name	NA
Group / Art Unit	NA
Attorney Docket No.	0694-134

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number: 08-2776

Deposit Account Name: Hopgood, Calimafde, Kalil & Judlwe, LLP

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2. ☑ **Payment Enclosed:** ☑ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	690.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	345	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 690.00

2. EXTRA CLAIM FEES

	Extra Claims			Fee from below	Fee Paid
Total Claims	8	-20** =	0	X 18	= 0
Independent Claims	1	- 3** =	0	X 78	= 0
Multiple Dependent					=

***or number previously paid, if greater, For Reissues, see below*

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim, if not paid
109	78	209	39	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40.00
146	690	246	345	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR § 1.129(b))	

Other fee (specify) _____

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 40.00

SUBMITTED BY				Complete (if applicable)	
Name (Print/Type)	Bradley N. Ruben	Registration No. (Attorney/Agent)	32,058	Telephone	(212) 551-5000 x 4081
Signature	Bradley N. Ruben			Date	2 October 2000

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FIRE-PROTECTION GLASS PANEL WITH A HEAT SHIELDING CHARACTERISTIC

Background of the Invention:

The present invention relates to a fire-protection glass product such as a glass panel for use as a building material to prevent spread and expansion of fire and to assure the safety during escape from fire and, in particular, to a fire-protection glass product having a heat shielding characteristic.

As a glass product called a fire-protection glass, a wire glass, a tempered glass, and a crystallized glass are known and already put into practical use. Such fire-protection glass has heat resistance and not only serves to shield flames and smokes upon occurrence of fire but also serves as a transparent window for assuring an inside view. However, the fireproof glass can not substantially attenuate heat radiation towards an unburnt area. Such heat radiation may cause the spread of fire to a next room and the difficulty in assuring a safe escape route.

In order to shield the heat radiation, proposal has been made of a fire-protection glass product having a multilayer structure comprising two glass plates 1a and 1b with a gel layer 5 interposed therebetween as illustrated in Fig. 1. Upon occurrence of fire, the gel layer 5 foams, i.e., produces bubbles to exhibit a heat shielding characteristic.

However, the above-mentioned fire-protection glass product uses a large amount of a gel material so that a high material cost is required. In addition, since the above-mentioned glass product is large in thickness and heavy in weight, a high construction cost is also required. Moreover, upon

occurrence of fire, the gel layer foams in several minutes to become opaque. This means that the function of assuring the inside view as the transparent window can not substantially be expected.

Summary of the Invention:

It is therefore an object of the present invention to provide a fire-protection glass product which has both fireproof and heat shielding characteristics, which is light in weight and small in thickness to be easily equipped, and which does not require a gel layer.

According to one aspect of the present invention, a fire-protection glass product having a heat shielding characteristic comprises a plurality of fireproof glass plates, a resin intermediate layer interposed therebetween, and a heat-ray reflection film or IR reflection film formed on the surface of at least one of said glass plates. The heat-ray reflection film has a reflectance of 70% or more for a light of the wavelength of 2500nm and an average transmittance of 60% or more for visible rays.

At least one of the fireproof glass plates may be made of a heat-resistant transparent crystallized glass.

In the fire-protection glass product according to this invention, the heat-ray reflection film, which is transparent, is formed on one or both of opposite surfaces of at least one fireproof glass plates. With this structure, heat rays produced upon occurrence of fire are reflected by the heat-ray reflection film to suppress heat emission and to attenuate heat radiation to the next room. Furthermore, a resin material used as the intermediate layer is darkened by temperature rise upon occurrence of fire and absorbs the heat rays. At usual times, the fire-protection glass product of this invention serves as a safety glass by provision of the intermediate layer which prevents shattering or scattering of cracked glass pieces when the glass product is damaged or broken by collision or impact.

The heat-ray reflection film has a reflectance of 70% or more for a light of a wavelength of 2500nm. Upon occurrence of fire, the temperature of a burnt area falls within a range between 800℃ and 900℃. At this time, an energy distribution of the heat ray radiated therefrom corresponds to a light of a wavelength of 2000 to 3000nm. If the heat-ray reflectance is 70% or more for a light of the wavelength of 2500nm, the heat-ray reflection film reflects the heat radiation upon occurrence of fire and sufficiently suppresses heat radiation into the unburnt area. On the other hand, if the heat-ray reflectance is 70% or less for a light of the wavelength of 2500nm, the heat-ray reflection film cannot substantially attenuate the heat radiation so that heat-shielding characteristic is insufficient. The heat-ray reflection film has such a spectral characteristic or a light selectivity that it has reflectance of 70% or more, 50% or more, and 80% or more for spectra lights of wavelengths of 2500nm, 1500nm and 3000nm, respectively.

The heat-ray reflection film has an average transmittance of 60% or more for visible rays (400nm to 700nm). If the average transmittance for the visible rays is less than 60%, light transparency of the film is so low so that a sufficient range of view or sight cannot be assured through the glass panel with the film. This deteriorates the function of the glass panel as a window. Preferably, the heat-ray reflection film has an average reflectance of 15% or less for visible rays.

As the heat-ray reflection film having the above-mentioned characteristics, use is most preferably made of an indium oxide film containing tin, an antimony oxide film containing tin, a tin oxide film containing fluoride, or a tin oxide film containing antimony. Alternatively, a ZnO-based transparent film can also be used. These films can be deposited on the glass plate by sputtering, spraying, dipping, or the like.

The heat-ray reflection film has a thickness between 1000Å and 15000Å. If the thickness is not greater than 1000Å, the heat-ray reflectance at the wavelength of 2500nm tends to fall within the range not greater than 70%. If the thickness is not smaller than 15000Å, the average transmittance for visible rays tends to fall within the range not greater than 60%.

As the fireproof glass plate, use may be made of a low-expansion crystallized glass, a borosilicate glass, a strengthened glass, and the like, alone or in combination. In particular, the low-expansion crystallized glass is preferable as the glass plate because it is resistant against the fire continuing for a longer time period and does not break even if it is spayed water by a sprinkler.

Upon occurrence of fire, the resin intermediate layer serves to absorb heat rays because the resin material is carbonized (blackened) by incomplete combustion. At normal times, the resin intermediate layer serves to assure the safety by preventing the release and the drop of the glass pieces when the glass plate is broken. As the resin material, use may be made of fluorocarbon resin, polycarbonate resin, polyethylene terephthalate resin, and the like.

In order to achieve a higher heat shielding characteristic, the fire-protection glass product may have a double-glazing structure including an additional glass plate attached through an air layer. The fireproof glass plate may be combined with a soda-lime glass plate.

Now, embodiments of this invention will be described in detail with reference to the drawing.

Brief Description of the Drawings:

Fig. 1 is a sectional view of a conventional fire-protection glass panel having a gel layer;

Fig. 2 is a sectional view of a fire-protection glass panel according to an embodiment of this invention; and

Fig. 3 is a sectional view for describing a multilayer glass panel using the fire-protection glass panel illustrated in Fig. 2.

Description of the Preferred Embodiments:

Description will now be made as regards embodiments of this invention with reference to the drawing.

As illustrated in Fig. 2, a fire-protection glass panel having a heat shielding characteristic comprises two fireproof glass plates 1a and 1b, a resin intermediate layer 2 interposed between the glass plates 1a and 1b, and a heat-ray reflection film 3 formed on an outer surface of the fireproof glass plate 1a. The heat-ray reflection film 3 has a reflectance of 70% or more for a light of the wavelength of 2500nm and an average transmittance of 60% or more for visible rays.

Referring to Fig. 3, a multi-layer glass panel comprises the fire-protection glass panel illustrated in Fig. 2 and an additional fireproof glass plate 1c with an air layer 4 interposed therebetween. This structure achieves a higher heat shielding characteristic. The fireproof glass plate may be combined with a soda-lime glass plate.

Now, specific examples of the fire-protection glass panel of this invention will be described in detail together with comparative examples.

Example 1

At first, preparation was made of two heat-resistant transparent crystallized glass plates (FIRELITE manufactured by Nippon Electric Glass Co., Ltd.) each of which has a dimension of 950×600×4mm and a thermal expansion coefficient of -5×10^{-7}/℃.

Subsequently, an ITO (indium-tin oxide) film was deposited onto one surface of one of the glass plates by the use of a sputtering apparatus at a temperature of 350℃. The ITO film had a thickness of 4000Å.

Then, each glass plate was cut into a sample piece having a dimension of 900×600×4mm. Using the sample piece, the spectral characteristic of the glass plate after the above-mentioned deposition was measured by the use of a spectrophotometer. Herein, the reflectance was measured as a total internal reflectance using an integrating sphere while the transmittance was measured without using the integrating sphere.

As a result, the reflectance for a light of the wavelength of 2500nm was equal to 95% and the average transmittance for visible rays was equal to 81%. Thus, these values were preferable as external appearance of the film.

Subsequently, as a resin intermediate layer, preparation was made of a fluorocarbon resin film comprising a copolymer containing 40 weight% of tetrafluoroethylene (TFE), 20 weight% of hexafluoropropylene (HFP), and 40 weight% of vinylidene fluoride (VDF) and having a chain molecular structure. The film had a thickness of 500 μm. The resin film was placed between the fireproof glass plates and subjected to thermo-compression bonding to obtain the fire-protection glass panel as illustrated in Fig. 2. The thermo-compression bonding was carried out by holding the resin film at a predetermined temperature for 15 minutes under a pressure of 1.27MPa.

Example 2

Preparation was made of two tempered borosilicate glass plates having a dimension of 950×600×4mm, similar to that of Example 1.

Subsequently, one of the glass plates was heated by an electric furnace to a temperature of 600℃. Then, stannic chloride solution containing 1% antimony was applied onto one side surface of the above-mentioned glass plate by the use of a spraying device to deposit an antimony-containing tin oxide film. The tin oxide film thus obtained had a thickness of 2500Å.

In the manner similar to that mentioned in conjunction with Example 1, measurement was made of the spectral characteristic of the glass plate after

the above-mentioned deposition. As a result, the reflectance for a light of the wavelength of 2500nm was equal to 78% and the average transmittance for visible rays was equal to 74%. These values were preferable as external appearance of the film.

Thereafter, as the resin intermediate layer, preparation was made of a polyethylene terephthalate resin film having a thickness of 200 μm and having adhesive layers formed on opposite surfaces thereof. By the use of the resin film, the two glass plates were adhered to each other to obtain the fire-protection glass panel as illustrated in Fig. 2.

Comparative Example

For the purpose of comparison, preparation was made of a tempered borosilicate glass plate similar to that in Example 2.

Then, in the manner similar to Examples mentioned above, measurement was made of the spectral characteristics of the glass plate. As a result, the reflectance for a light of the wavelength of 2500nm was equal to 7% and the average transmittance for visible rays was equal to 85%.

Evaluation

Each sample of Examples 1 and 2 and Comparative Example was subjected to a heat-shielding test.

The heat-shielding test was performed in the following manner. At first, each sample was fixed to a frame at its end surfaces so as to avoid the end surfaces from being heated, and was arranged in front of a flat heating furnace. Then, the sample was heated in accordance with a standard heating curve provided in the Official Notification No.1125 of the Ministry of Construction of Japan. By the use of a heat flow sensor located at a distance of 0.5m from the center of an unheated surface of the sample, the maximum heat received thereat (W/cm^2) was measured after lapse of 60 minutes. Those samples of Examples 1 and 2 were tested for a case A in which the heat-ray reflection film

was positioned on a heated side or a side facing the heating side and a case B in which the heat-ray reflection film was positioned on the opposite or unheated side. The results are shown in Table 1.

Table 1

	Example 1	Example 2	Comparative Example
Reflectance			
Average for Visible Rays	12	19	6
1500nm	60	55	6
2500nm	95	78	7
3000nm	98	83	7
Transmittance			
Average for Visible Rays	81	74	85
1500nm	8	15	86
2500nm	3	18	87
3000nm	2	15	88
Heat Received (W/cm^2)			
Case A	1.0	1.2	3.1
Case B	1.1	1.3	-

As is obvious from Table 1, each of the Examples exhibited the heat received as low as 1.0-1.3W/cm^2 after lapse of 60 minutes (925℃) after start of heating. Furthermore, each of the Examples was maintained for more than about 15 minutes after start of heating to allow the other side to be seen through it.

For a conventional fire-protection glass panel (manufactured and sold by SAINT-GOBAIN CERAMIQUES IND. (FRANCE) under the trade name of CONTRAFLAM) which comprises the gel layer 5 interposed between two glass

plates 1a and 1b as illustrated in Fig. 1, the similar heat shielding test was performed. As a result, the heat received was sufficiently low but foaming of the gel layer 5 occured so that the other side can no longer be seen through it after lapse of about 4 minutes after start of heating.

In the fire-protection glass product according to this invention, the heat radiation upon occurrence of fire is reflected by the heat-ray reflection film and absorbed by blackening of the resin layer interposed between the glass plates. Therefore, the fire-protection glass product has high heat-shielding characteristic. This suppresses the probability of combustion or ignition of matters present in a room adjacent to the fired room to thereby prevent the spread of fire. In addition, it is possible to assure a safe escape route upon occurrence of fire. Furthermore, since the light transparency can be maintained for a predetermined time duration, the status of fire can be visually confirmed to thereby facilitate lifesaving and fire fighting. Moreover, the fire-protection glass product according to this invention is thin in thickness, light in weight, and low in construction cost and is therefore advantageously used as a building material.

WHAT IS CLAIMED IS:

1. A fire-protection glass product having a heat shielding characteristic, comprising:

a plurality of fireproof glass plates;

a resin intermediate layer interposed between adjacent ones of said glass plates;

a heat-ray reflection film formed on the surface of at least one of said glass plates and having a reflectance of 70% or more for a light of the wavelength of 2500nm and an average transmittance of 60% or more for visible rays.

2. A fire-protection glass product as claimed in claim 1, wherein at least one of said fireproof glass plates is made of a heat-resistant transparent crystallized glass.

3. A fire-protection glass product as claimed in claim 1, wherein said resin intermediate layer is made of a material selected from fluorocarbon resin, polycarbonate resin, and polyethylene terephthalate resin.

4. A fire-protection glass product as claimed in claim 1, wherein said heat-ray reflection film is formed on at least one of opposite surfaces of said fireproof glass plates.

5. A fire-protection glass product as claimed in claim 1, wherein said heat-ray reflection film is made of a material selected from indium oxide containing tin, antimony oxide containing tin, tin oxide containing fluorine, and tin oxide containing antimony.

6. A fire-protection glass product as claimed in claim 1, wherein said heat-ray reflection film has a thickness between 1000Å and 15000Å.

7. A fire-protection glass product as claimed in claim 1, wherein said heat-ray reflection film has a reflectance of 50% or more for a light of a

wavelength of 1500nm and 80% or more for a light of a wavelength of 3000nm, and an average reflectance of 15% or less for visible rays.

8. A fire-protection glass product as claimed in claim 1, said glass product having a double-grazing structure including an additional glass plate attached through an air layer.

Abstract of the Disclosure:

A fire-protection glass product having a heat shielding characteristic comprises a plurality of fireproof glass plates, a resin intermediate layer interposed between adjacent ones of the glass plates, and a heat-ray reflection film. The heat-ray reflection film is formed on the surface of at least one of the glass plates, and has a reflectance of 70% or more for a light of the wavelength of 2500nm and an average transmittance of 60% or more for visible rays. The resin intermediate layer is made of a material selected from fluorocarbon resin, polycarbonate resin, and polyethylene terephthalate resin. At least one of the fireproof glass plates may be made of a heat-resistant transparent crystallized glass plate. The heat-ray reflection film may be formed on at least one of opposite surfaces of the fireproof glass plate. The heat-ray reflection film may be made of a material selected from indium oxide containing tin, antimony oxide containing tin, tin oxide containing fluorine, and tin oxide containing antimony. The heat ray reflection film has a thickness between 1000Å and 15000Å. The heat-ray reflection film has a reflectance of 50% or more for a light of a wavelength of 1500nm, a reflectance of 80% or more at a wavelength of 3000nm, and an average reflectance of 15% or less for visible rays.

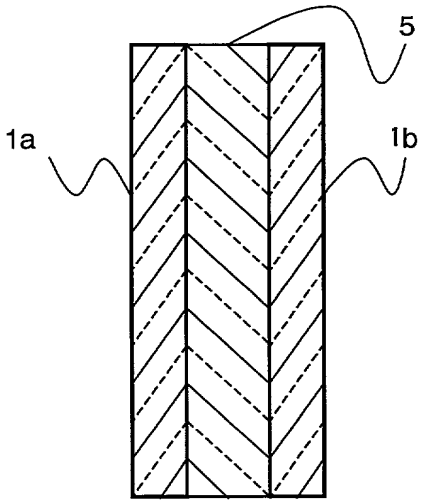

FIG. 1

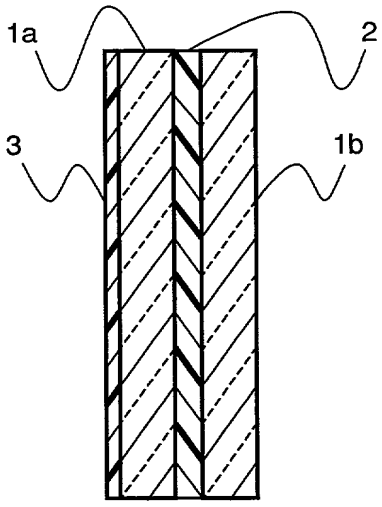

FIG. 2

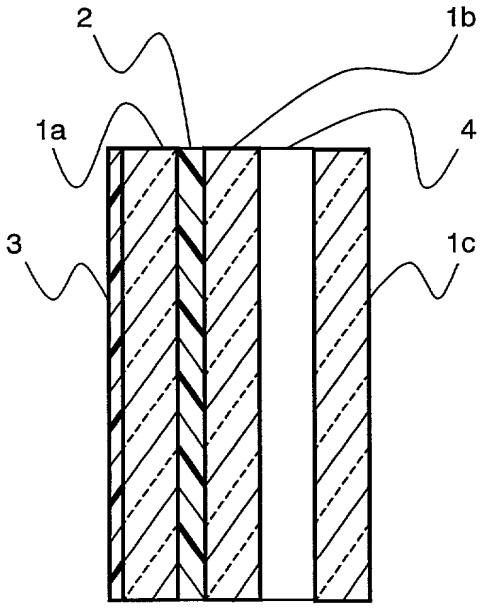

FIG. 3

9-1626

SOLE INVENTOR

Attorney's
Docket No._____

DECLARATION OF INVENTORSHIP AND POWER OF ATTORNEY

As the below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am an original, first and sole inventor of the subject matter which is claimed and for which a U.S. Utility Patent is sought on the invention entitled

FIRE-PROTECTION GLASS PANEL WITH A HEAT SHIELDING CHARACTERISTIC

the specification of which

[x] is attached hereto.
[ ] was filed on _____ as
Application Serial No. _____
and was amended on _____,
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims and the drawings presented therein and declare that the subject matter of the claims was part of the invention and was invented before the filing of the above-identified original application for such invention.

I hereby claim foreign priority benefits under Title 35, United States Code, §119, of any foreign patent application(s) and PCT International application(s) listed below and have also identified below any foreign patent application(s) having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Country	Application Number	Date of Filing	Priority Claimed Yes	No
Japan	278023/1999	30 September 1999	[x]	[ ]
			[ ]	[ ]
			[ ]	[ ]
			[ ]	[ ]

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Hopgood, Calimafde, Kalil & Judlowe, a firm consisting of Roy C. Hopgood, Reg. No. 15,245; Eugene J. Kalil, Reg. No. 16,686; John M. Calimafde, Reg. No. 16,895; Stephen B. Judlowe, Reg. No. 21,049; Marvin N. Gordon, Reg. No. 23,094; Francis J. Murphy, Reg. No. 24,537; James M. Rhodes, Jr., Reg. No. 25,229; Dennis J. Mondolino, Reg. No. 27,148; William G. Todd, Reg. No. 28,480; Ira B. Winkler, Reg. No. 29,223; Porter F. Fleming, Reg. No. 31,759; James M. Bollinger, Reg. No. 32,555, Jae H. Kim, Reg. No. 32,907 and Brian P. Murphy, Reg. No. 34,986 at that firm.

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New York, New York 10165

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Mr. Jae H. Kim, Esq.

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I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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